

**LEAN ENTERPRISE  
Development in Complex  
Engineer-to-Order Companies**

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PAPER**

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# LEAN ENTERPRISE

## Development in Complex Engineer-to-Order Companies

### Executive Summary

Maintaining a competitive advantage is paramount no matter what business sector you operate within. Engineer-to-Order (ETO) companies that produce complex products, usually in low volumes, using project management control techniques are no exception. To survive you need to adopt a process of continuous improvement that provides a better customer buying experience offering: improved product functionality, sustainable quality, better service, reduced lead-times and competitive prices. In a lean enterprise this involves the reduction or elimination of any activity that does not add value for the customer. These non-value-added activities are called “waste”.

Traditionally, lean has been the focus of high volume repetitive manufacturing industries like automotive and electronics. In these high volume industries, there are numerous success stories of how adopting lean practices has had a tremendous positive impact on the company. The competitive driver impacting ETO businesses, where many of the operational issues are different, can be addressed by adopting a lean approach. This means taking the concepts of lean beyond the manufacturing environment and applying them throughout your entire ETO enterprise.

No one is saying that the road to a lean enterprise will be easy. Making major changes to business culture and processes is risky. With IFS Business Modeler™ you can visually plan those areas that you wish to tackle first and measure progress using IFS Corporate Performance Management™. These tools support concurrent business process change so that you can test the effectiveness of introducing new processes by running these alongside existing methods and measuring the difference

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in performance. Using the IFS lean scorecard you will be able to challenge proven practices and only adopt those that really bring about the removal of waste and provide tangible business benefits.

This paper demonstrates how IFS Applications supports the principles of developing a lean enterprise for ETO organizations. It demonstrates how process improvements apply equally to office based functions as they do to manufacturing, installation and service activities.

## What is Lean Enterprise?

The concept of lean through the removal of waste (muda) began in the automotive industry in the post World War II years in Japan with Toyota pioneering lean concepts in their manufacturing methods. Facing a shortage in materials, Toyota developed ways of competing with imports from the United States of America by offering more customer choice, and by improving product quality and reliability. Today the Toyota Production System (TPS) is a model for all enterprises aspiring to adopt lean concepts. The term lean manufacturing itself was not coined until the early 1990s by three researchers from the Massachusetts Institute of Technology.<sup>1</sup>

The National Institute of Standards and Technology (NIST) Manufacturing Extension Partnership's Lean Network offers the following definition of lean manufacturing:

*“A systematic approach to identifying and eliminating waste through continuous improvement, flowing the product at the pull of the customer in pursuit of perfection.”<sup>2</sup>*

Although the NIST definition is brief, it is packed with information that applies equally to all areas of commerce including office based activities, manufacturing and service functions. It applies equally to low volume complex ETO businesses as it does to the high volume manufacturing world. It also applies to those activities performed by your collaborative partners within your value chain. Lean therefore covers the complete spectrum of your value chain—not as some believe—confined to just the manufacturing activities of high volume repetitive businesses. With this definition, the principles of lean manufacturing are applied to the whole business and form the basis of lean enterprise.

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<sup>1</sup> Womack, James, Daniel Jones, and Daniel Roos, *The Machine that Changed the World*, HarperCollins, 1990

<sup>2</sup> Jerry Kilpatrick, *Lean Principles*, Utah Manufacturing Extension Partnership, 2003

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The most important message to understand when adopting the concepts of a lean enterprise is that you need a systematic approach. Your organization will need to develop a strategy for deploying lean enterprise concepts. You will need to get corporate commitment to drive your competitive advantage by eliminating waste. Like all strategies, it takes time to effect change, so you need to begin by tackling change in the right order. For example, it would be ineffective to target workshop planning if there is no correlation between project milestone dates and manufacturing activities. Or to develop key performance indicators (KPI) on data that is out of date, unreliable or drives behavior that is in conflict with reducing waste.

Perfection can never be achieved, but each step increases competitive advantage and profitability. The process of developing a lean enterprise never ends. Lean is not a destination but a journey. On that journey there is always something else that you can do to reduce waste or improve upon a process.

## The Principles of Lean Enterprise

Adopting lean principles is good for your wealth. It enables your ETO enterprise to remain competitive and improve your position in the market. In a ‘brand’ dominated world it will be the most effective enterprises that will eventually dominate the market and own the leading brands. Less well run organizations that do not have efficient and effective processes will have to reduce assets to survive, resulting in brands being traded as a means of survival. Lean enterprises will dominate their chosen market.

Lean enterprise is customer value driven, and lean practitioners have defined five basic principles that are applied to organizations.

**Value** – Value must be externally focused. Lean thinking demands that anything that does not add value to a customer must be eliminated. However, only what your customers perceive as value is important. This will often require a complete review of each step in the customer buying process to create for them a hassle-free buying and service experience.

If your customers believe that short order lead-time from their suppliers is the differentiating factor in the market, within given standards of quality and functionality, then those who can respond the fastest will dominate. Price may become a secondary

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<sup>3</sup> Womack, James P., and Daniel T. Jones, *Lean Thinking*, Simon and Schuster, New York, NY, 1996

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issue, so premium pricing may apply to those who deliver in the shortest time. But it is often not as simple as that, and to define customer value will include a complete appraisal of the products, services and the customer buying experience.

**The Value Stream** – Once you understand the value that you deliver to your customers, you need to analyze all the steps in your business processes to determine which ones actually add value. If an action does not add value you should consider removing it from the process. You will need to review those processes that add value to see how these can be improved to provide better customer value. How many enterprises collect data about composite business processes and financial performance that add no value to the customer and are often never used within the business to track performance of any kind?

**Flow** – Flow relates to the uninterrupted movement of physical objects and data within the enterprise. In a complex ETO company this will mean that information from design will flow into engineering and into estimating and into projects and to procurement. In a complex contract this will mean as sections are completed in one department they are made available to others—rather than a single department spending weeks completing the contract before any information is made available.

Flow challenges the tradition of processing in batches and moving these batches from one department to another or from one machine to the next. This requires the removal of physical barriers or departmental ‘stovepipes’ and requires co-operation across functions. The goal is to reduce the time it takes to complete an end-to-end process. The process should enable single documents or components to flow continually from start to finish in the minimum elapsed time. The reduction of work-in-progress and the elimination of queues dramatically reduce cycle-times and improves customer due date adherence through the value chain.

**Pull** – Rather than working from a forecast of potential customer demands—a ‘push’ system; the goal in Lean is to perform a process by linking it directly to a real customer demand—a ‘pull’ system. Most ETO businesses produce product or provide a service when they have received a customer order or contract, so one could say they have a natural pull system anyway. On the contrary, often in ETO organizations there are broken links between when the customer requires part of the delivery to when the delivery is available—or when the activity is showing required on the project plan. Synchronized and seamless flow from concept to approved and accepted delivery will enable information, instructions and production to harmonize with the demands from the customer.

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**Perfection** – As you continually eliminate waste from your processes and flow information, product, or services, you will realize that there are always changes that can be made in the goal of perfection. The continual re-evaluation of the entire value stream is essential to remove non-customer value adding activities.

These five lean principles need to all work together and are fundamental to the elimination of waste. You must revisit each of them as improvements in one area provide opportunities for improvements in another. Never assume that further improvements can't be made. To rest along the journey to perfection is effectively to go-backwards. To succeed you always need to be performing better than your competitors.

## Benefits of Lean Enterprise

Historically, lean thinking was adopted first in the high volume repetitive manufacturing industries, so much of the analysis of the benefits relates to these industries. Lean principles can be applied equally, but with a different emphasis to complex ETO organizations—the removal of waste is good for all, no matter what you do. The trends for the early adopters of lean principles are encouraging. A recent survey<sup>4</sup> conducted in 2003 of 40 companies who adopted lean concepts in their operating plants, typical improvement included:<sup>5</sup>

### Operational Improvements

- 90% reduction in lead time (cycle time)
- 50% increase in productivity
- 80% reduction in work-in-process inventory
- 80% improvement in quality
- 75% reduction in space utilization

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<sup>4</sup> Utah Manufacturing Extension Partnership, 2003, the NIST Manufacturing Extension Partnership

<sup>5</sup> Jerry Kilpatrick, Lean Principles, Utah Manufacturing Extension Partnership, 2003

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### Administrative Improvements

Improvements within the manufacturing part of the enterprise are, in some cases, the effects of improvements in the commercial or administrative side of a business who are providing accurate and more timely data. The removal of waste on project planning, design, purchasing, contract management, and finance all contribute to the drive for improving customer value. Recorded improvements within the 40 sample companies include:

- Reduction in order processing errors
- Streamlining of customer service functions
- Reduction of paperwork in office areas
- Reduced staffing demands, allowing the same number of office staff to handle a larger number of orders
- Documentation and streamlining of process steps, enabling non-critical functions to be outsourced and allowing a company to focus its efforts more on customers' needs
- Reduction in staff turnover and resulting costs of attrition
- Implementation of job standards and pre-employment profiling, ensuring the hiring of only above-average performers (consider the benefits if everyone performs as well as the top 20%)

### Strategic Improvements

Reduced customer lead-times, reduced operating costs, and improved quality provides business opportunities. They all provide a more competitive position to leverage market share from competitors who are less agile, have higher operating cost and poorer quality.

### Lean Enterprise Benefits in Complex ETO

The benefits for adopting lean enterprise concepts in a complex ETO business will depend on the level of integration that exists from design through engineering into build, installation, and service. IFS provides software solutions that enable integration, connectivity, and a single source of data opportunity. This will be the starting point

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for analyzing the removal of waste and activities that provide no real customer value. Lean enterprise benefits for complex ETO organizations include:

- Improved bid management and win ratios from data re-use and business focus
- Better project control, risk mitigation, and cost management through the integration of project management activities with back office functions
- Improved design and delivery data through web-portal collaboration with customers and suppliers
- Reduced data input and errors through sharing common data from design to manufacture, installation, and service
- Increased business capacity through synchronizing delivery milestones with current work tasks
- Reduced customer delivery cycle times through parallel planning and concurrent activities
- Improved customer deliveries dates from common data and integrated design, build and install solution
- Improved customer satisfaction from better quality, lower prices and on-time delivery
- Improved quality and design by analyzing failures

## IFS Applications Supports Lean Enterprise

IFS Applications is built to enable lean enterprise initiatives for complex ETO organizations. Initiatives that allow you to analyze, change, and review your end-to-end processes from quotation, design & engineering, project planning, financial management, buy, make, install and service. IFS Applications provides four supporting functional areas:

- Business Modeling
- Corporate Performance Management (CPM)
- Planning and Execution
- Waste Analysis and Reduction

### Business Modeling

All steps in a business process can be modeled using the IFS Business Modeler. This functionality produces value stream maps (see Figure 1) to allow: office, factory and site based processes to be defined, continually reviewed and modified.

For example, material receipt from a vendor may currently be a two-stage process with inspection prior to put-away. It is possible to change the process to just put-away

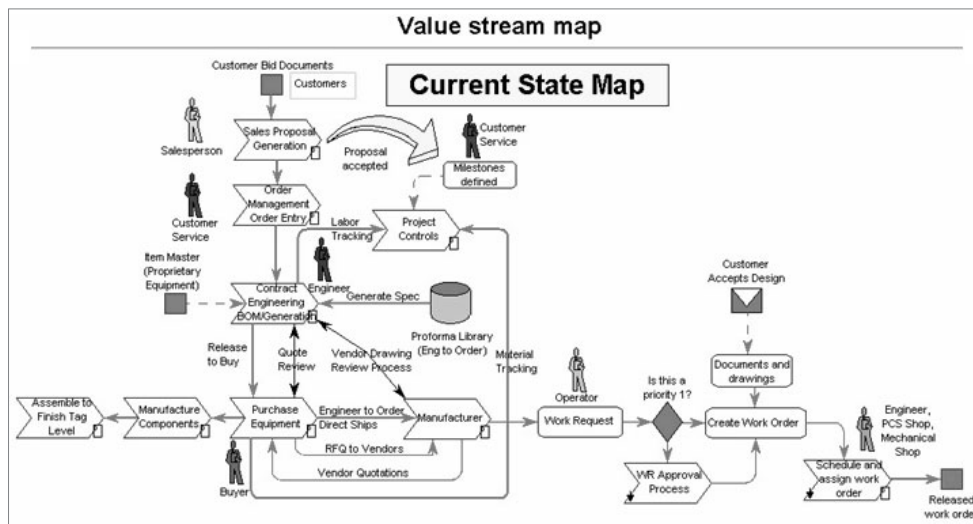


Figure 1. Value stream map created in Business Modeler™

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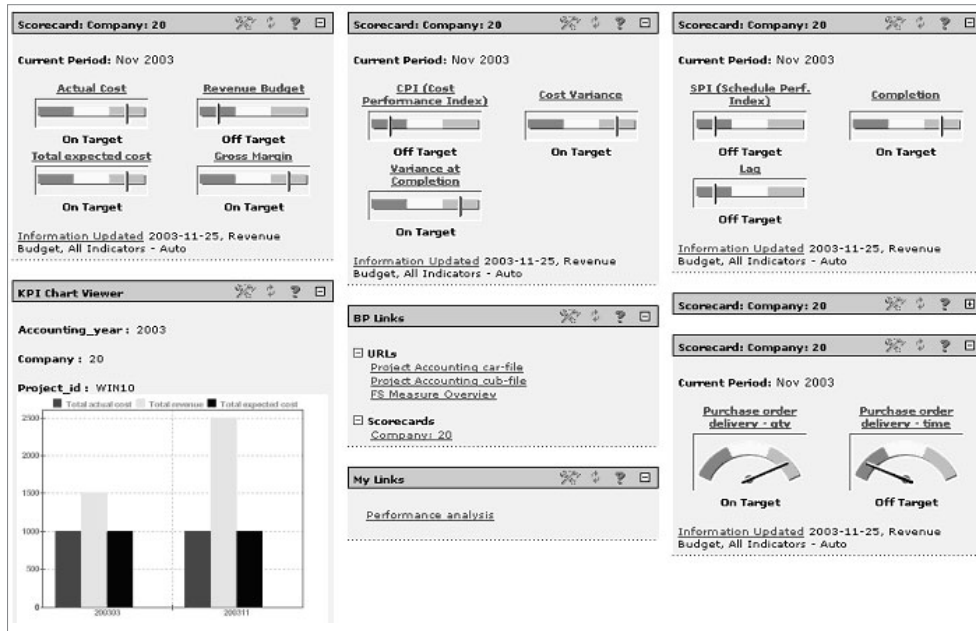


Figure 2. ETO Scorecard created in CPM

for only those vendors who have demonstrated a consistent level of quality. This enables new processes to be run alongside existing, and their success or failure is measured and monitored. It also enables skilled persons to act as challengers to established processes by running the new process concurrent with the old. This will determine if the changes deliver any real customer value, before a permanent change is made.

### Corporate Performance Management

IFS Corporate Performance Management contains a number of pre-delivered balanced scorecards (see Figure 2) to monitor progress along the journey to becoming a lean enterprise. By examining your current business processes (current business models) and benchmarking these to different key performance indicators (KPIs) you can construct an orderly step-by-step plan to migrate from the current state to a future planned state. The scorecard provides the starting point from which to generate awareness and understanding, and to begin the removal of waste. It is the tool to integrate people and process and to measure performance between different business models.

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Once progress is being made and the performance dials begin to show a shift from the red to the green, it is time to again review procedures to tighten-up and attempt to remove more non-value added waste. CPM provides the tools to measure success or failure and make changes to ensure that the business goals are achieved.

### Planning and Execution

Lean enterprise drives work to be done only to satisfy a customer demand—a pure pull system. In a complex ETO organization, the customer demand can be a customer order or a contract for the provision of goods or services, or even tentative in the form of a bid. This demand triggers activities in the engineering design, project planning, estimating, project costing, procurement, manufacturing, and installation departments. The key to achieve a timely and cost effective delivery is the co-ordination of these activities. IFS Applications provides the integration from design into manufacture and purchase, project planning, financial management and cost control. These integrate with the human resources system to check that sufficient skills are available to meet the scheduled plan, and with document management to ensure all controlled documents are available and correctly managed.

#### **Bid Management**

The key to reducing waste in the bid process is the ability to reduce the time and effort put into the bid, improve the accuracy of the information used and convert more bids into wins while retaining or improving operating profit or margin. IFS provides functionality to reduce waste in the bid and conversion-to-live contracts as follows:

- Re-use where applicable: previous designs, actual times, actual costs, contract terms and conditions
- Use the quotation information as input into the customer contract to minimize rework by the project organization when they take over a won deal from sales
- Deploy project controls in the RFQ phase to manage vendor and partner prices and quotations
- Use simulation to align resource availability and capacity with customer delivery requirements to ensure the plan is achievable
- Decompose the requirements into small executable activities and run as many of these in parallel as possible to reduce cost and improve cash flow and delivery lead-times

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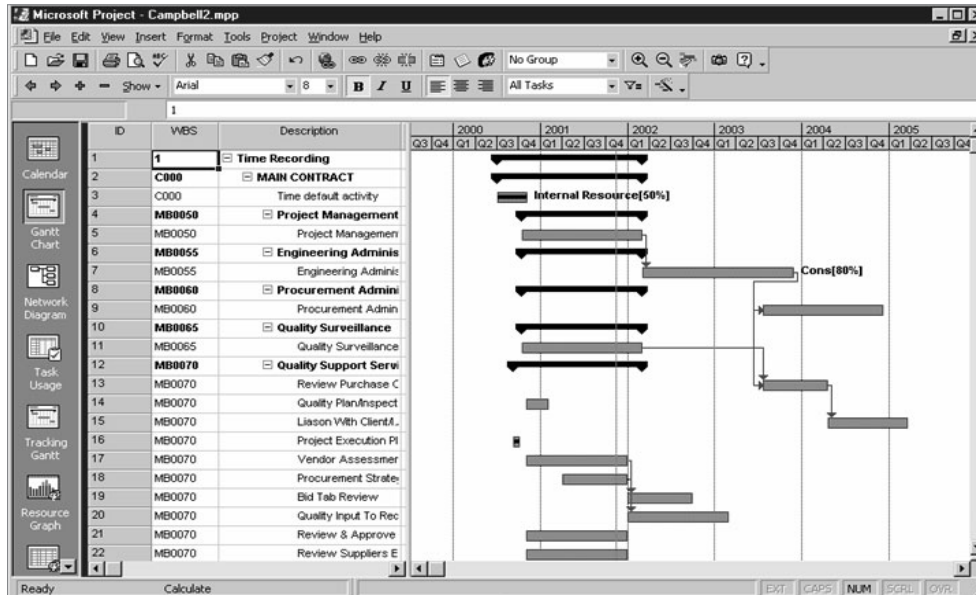


Figure 3. Example of a project exported to Microsoft

### Project Management

IFS Project Management™ provides an integrated solution to ensure that planned tasks and activities are fully synchronized with resource and material requirements to fulfill the customer contract. Changes made during the project lifecycle are reflected in the project plan which, automatically signals changes required through project delivery along with the consequential cost and delivery implications on the project. This integration ensures that any material or resource waste is highlighted so that corrective action may be taken.

**Project planning**—IFS provides full integration into Microsoft and Primavera project planning systems (see Figure 3). Plans built in the suite can be exported into these products for day to day planning and scheduling, and re-imported when change is to be reflected in procurement or manufacturing activities or at period ends for financial accounting and reporting. This enables the use of familiar planning tools both internally and with your suppliers and customers—familiarity that provides a common understanding that helps to quickly identify activities that do not add customer value and need to be removed.

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**Resource management** – IFS Human Resources™ includes functionality to manage resource skill levels, training, and competency levels—with the ability to match these to actual requirements. This enables the scheduling of resources and the planning of future needs to be harmonized with demand to deliver customer orders. In a complex ETO organization, matching skill to demand will significantly reduce waste and improve timely deliveries to customer contract.

**Engineering and Change Management**

IFS Applications manages design changes in two stages. First, during the Engineering Change Requests stage, all change proposals from the organization are registered. These change proposals might include fault reports from the service department, the design departments own improvements, or a recommendation from the purchasing department to change supplier material. The proposals are analyzed and formally approved.

Second, in the Engineering Change Order stage, the design change is planned and implemented. The product structure helps to define items and minimize the work involved in making modifications. When the work is finished, a new part revision is created.

Changes are tracked through the complete product lifecycle from design, build, in-service maintenance, repair and overhaul—and finally to retirement and disposal. Providing a consistent and reliable link to eliminate errors, improve quality and reduce waste.

**Integrated change management** – ETO businesses often don't have a complete design before the work needs to begin. IFS solutions provide the ability to order from suppliers and sub-contractors and to start manufacturing—as information is available from engineering and as start tasks are initiated on the project plan. There is no need to have a completed design and list of materials before ordering can begin. Changes in customer requirements can be managed and revisions in component design and order details made and synchronized back to the project plan using a project delivery structure. The system allows the re-use of any standard product design structures and previous project plans. Integrated change management provides the view to assess the impact change will have on drawings, documents, purchase orders, resources etc.

**Collaboration**

To collaborate with your partners and suppliers, you need a system where the project and engineering activities are integrated with back office systems. IFS solutions provide complex ETO companies with that integration. The integrated applications can be

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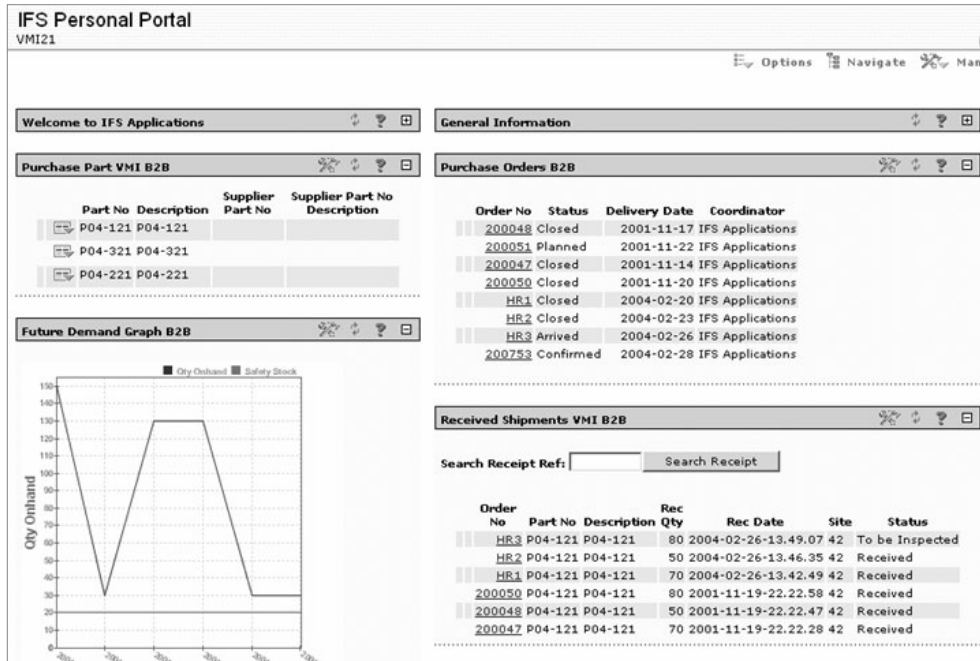


Figure 4. Collaboration portal view

accessed externally using web functionality to provide a low cost and easy to use solution. Web-based portal technology makes it easier to collaborate with your suppliers, partners and customers. Instead of sending information back and forth in the form of purchase orders or schedules, you and your suppliers can access inventory balances and future demands through a convenient portal. Suppliers can replenish requirements as required and customers can check to see that their demands are being fulfilled. This will enable suppliers to reduce waste by focusing on work in the correct sequence, which in turn will aid to reducing delivery lead-times.

**Source data** – In a complex ETO business, some of the design work will have been completed by your suppliers. They can connect via the web portal to the IFS system to download the drawings and parts lists—this will foolproof your systems when you need to re-order repeat parts or when you order spares, reducing the risk for both parties of buying or making incorrect items. Your collaboration partners use the IFS portal (see Figure 4) to enter or search for information and update documents. Within the IFS system they are treated as another application user with agreed access and security.

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**Integration**

IFS Applications provides a set of adapters that make it easy to exchange information from CAD systems. The transfer into engineering specifications, complete with revision control, enables purchasing and manufacturing to share the data as soon as it is available without re-keying and without introducing transcription errors. The system allows engineers and designers to access planning data directly from their CAD workstation, enabling responsive decision making and eliminating costly and wasteful scrap or rework.

**Data quality** – Integration within the IFS suite provides the opportunity for a single instance of information within the enterprise, which is available to all—and is available for sharing with collaborative partners. It has been said that the only data anyone in a business should be interested in is incorrect data, the system will look after the good data and prompt users when to take actions that relate to it. Bad data drives decisions and actions that will lead to waste and customer non-value add activities. A leading analyst firm believes that at least one quarter of Fortune 1000 companies are working with poor quality data. The main problems relate to data that is incomplete and not synchronized across the enterprise. IFS believes that data quality is the key to enabling a start on the process of adopting business driven lean enterprise initiatives.

**Costing** – Complex ETO requires costing information to be collected in a timely way during the design, make, deliver and install lifecycle. IFS Applications provides full integration with all the functions that add to the cost of a customer contract. These costs can be reviewed and analyzed at any time and compared with planned values and values from similar project so that corrective action can be taken early to avoid cost over-runs.

**Document management** – In complex ETO organizations managing documentation is an essential part of day-to-day operations—a way of ensuring that the right people get the right information at the right time. Mismanaging the flow of information can result in confusion, unnecessary delays, and costly errors. With IFS Document Management™, you get full control over your company’s documentation to ensure that everyone is working to the correct details on the design to meet the customer requirements. The IFS solution provides a secure and integrated environment that can be used by sales, design, engineering, finance, projects, corporate standards, quality, HR, manufacturing, installation and maintenance. The use of corporate templates combined with access and revision control delivers repeatability and consistency.

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**Service management** – In complex ETO there is often the desire to manage the on-going service maintenance of the product or installation. The data that was produced in the design, build and install stages is totally available to the service organization. IFS provides full functionality for the in-service maintenance requirements for both stationery and mobile assets. This integration of service activities provides feedback on fault types, symptoms, construction mistakes, usability, reparability, and durability—valuable feedback that can be used to improve quality, reduce waste, and improve customer value.

**Cellular Techniques**

Arranging operations and/or people in a U-shaped production line or ‘cell’ allows product to flow smoothly from one operation to the next, creating a working environment that aids more readily the highlighting of problems as they occur. This move away from traditional processing, where jobs sit in a queue at the next work center waiting for that operation to begin, requires a different approach. Analysis of components into like families, set-up reduction techniques to allow for the economical production of small quantities, offline setting, preparation, and calibration are all techniques that are used.

Traditionally it has been the high volume organizations that have turned to cellular processing. Complex ETO companies can benefit from this approach as it reduces the elapsed time a component or assembly in on the shop floor.

IFS Applications lets you define an unlimited number of cells called ‘production lines’, each with its own dedicated inventory storage area. Incoming materials can be routed directly to the production line at which they will be consumed. Finished items completed at the production line can be stored there until required by assembly or installation.

**Event Management**

Within the application IFS manages events by the deployment of an Event Server, which is used to notify individuals via e-mail when a predetermined event in the application happens. Such an event could be the addition of a new customer order or the start of a new employee. To ensure that additional details are added to a customer order by say the costing department the new order addition creates an e-mail message to the appropriate individual in accounts. Event management controls the flow of information from one department to the next in a timelier manner than traditional batch methods.

## Waste Reduction

Waste is commonly defined as non-value-added activity. Within the enterprise this can be any activity. Lean practitioners identify seven types of waste:

- **Excess (or early) production**– Producing more than the customer demands, or producing it earlier than the customer needs it. This ties up valuable labor and material resources that might otherwise be used to respond to other customer demand. This applies equally to design and engineering activities as it does to physical product.
- **Delays** – Waiting for materials, tools, information, equipment, etc. This may be a result of poor planning, incomplete engineering design, late supplier deliveries and lack of communication or overbooking of equipment or resources.
- **Transportation (to/from processes)** – Moving material more often than necessary. Material should be delivered and stored at its point of use. Why receive material at a receiving dock, move it to an inventory location, and then move it to the production floor when it can be delivered and stored where it is used?
- **Inventory (and work in progress)** – Having more material than is needed wastes valuable space and cash. It also means that if the design is changed then the materials may become scrap or require rework.
- **Processing** – Doing more work on a part than is necessary, including inspection and reworking, or performing additional steps within a business process. This wastes time and money. Quality must be built into processes so that they are performed correctly the first time.
- **Defects** – Defects consume considerable resources. In addition to the original materials and labor used to manufacture the part, extra labor and machine time are required to fix the defect. If the defective part or service is sold to a customer, not only will unnecessary costs be lost, but more resources will be consumed to resolve the eventual complaints and to repair damaged customer relationships.
- **Movement** – Excess motion of employees in getting tools, picking parts, moving from one point to another on the factory floor or within the office is an often overlooked area of waste. This is usually the result of poorly planned work layout and workflow.

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With an integrated solution, the ability to start, review, and eliminate waste becomes so much easier. Each of the steps in the end-to-end process can be modeled using the IFS Business Modeler and areas highlighted for review. Process changes can then be made and progress monitored using CPM. IFS provides closed loop tools to identify, change and manage processes to eliminate waste—waste in the design and commercial activities, waste in project planning, waste in procurement, waste in manufacture, installation and service.

A variety of techniques are available for reducing or eliminating waste, these include:

- Value Stream Analysis
- Total Quality Management
- Total Productive Maintenance
- Kaizen Costing and Cost Analysis

**Value Stream Analysis**

Value stream mapping is an excellent place to begin your lean journey because it will help you and your employees understand the big picture of your business enterprise. You begin by mapping your current state, showing all actions (both value-added and non-value-added) currently required to bringing a product or service from the design phase through customer delivery and installation.

Once your current state is mapped, you have a clearer picture not only of where waste appears but also of what the sources of this waste are. You can then map the desired future state of your business using IFS Business Modeler, showing more efficient, smoother-flowing processes. Process improvements are measured using IFS Corporate Performance Management for continuous feedback on progress and to provide non-subjective empirical analysis.

The final step is preparing and beginning to use an implementation plan that describes, on one page, how you plan to achieve the future state. This is an iterative process since your value maps must be reviewed regularly to find additional ways of improving the flow of material and information.

**Total Quality Management**

Total quality management (TQM) is a management system used to continuously improve all areas of a company's operation. Quality functionality is integrated throughout IFS Applications.

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Figure 5. Process Failure Mode and Effect Analysis

Failure modes and effects analysis (FMEA) is a systematic technique for managing risk in a complex ETO organization. It involves recording and analyzing actual and potential problems with a product design or process, along with related solutions (see Figure 5). This information allows you to improve accountability, avoid repeated mistakes, and improve the quality of the end product or maintenance service.

Control plans can be defined to detail the measurements and tests performed at any operation within the workshop or against a purchase receipt. This helps to identify defects before any further value is added to them. IFS Applications also includes material review board (MRB) functionality for handling the disposition of defective material.

#### **Total Productive Maintenance**

Total productive maintenance capitalizes on proactive and progressive maintenance methodologies and calls on the knowledge and cooperation of operators, equipment vendors, engineering, and support personnel to optimize machine performance. IFS Maintenance™ is a world-class maintenance package that is completely integrated with IFS' supply chain management solution. Both maintenance and production workers have complete visibility into maintenance and production information and schedules. Operators can regularly perform preventive maintenance on equipment and tools, with maintenance personnel handling more detailed overhauls and repairs. The result is optimal equipment performance, including the elimination of breakdowns,

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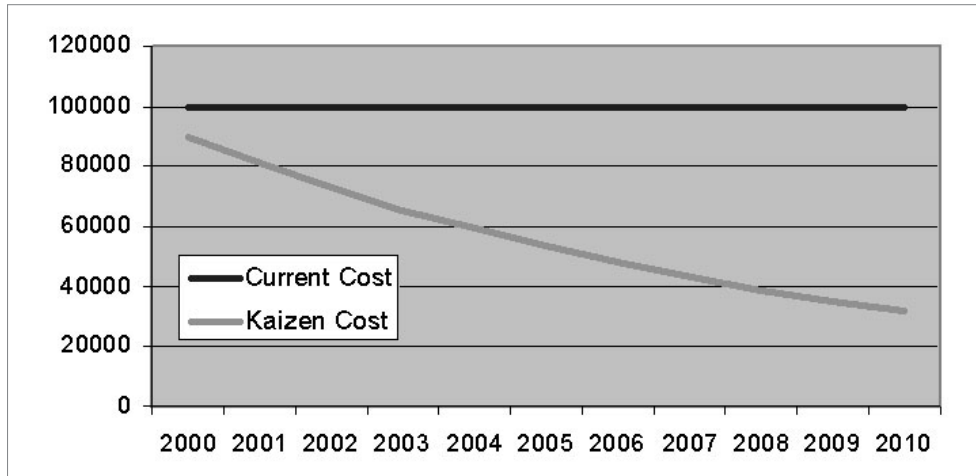


Figure 6. A system of continuous cost reductions. Current cost compared to Kaizen cost.

a reduction in unscheduled and scheduled downtime, improved utilization, higher throughput, and better product quality. Bottom-line results include lower operating costs, longer equipment life, and lower overall maintenance costs.

#### **Kaizen Costing and Cost Analysis**

Unlike standard costing systems, a Kaizen costing system focuses on continuous cost reduction rather than simply meeting the standard and avoiding unfavorable variances. (see Figure 6).

As part of the Kaizen process, you verify that the costing target has been reached and then continuously review methods and processes to further reduce costs. In complex ETO this includes the costs associated with engineering design, estimating and project planning. In IFS Applications, you can set a cost target, calculate cost gaps, and plan activities to reduce costs using IFS Business Modeler. Major cost reductions can be broken into smaller reductions for which separate activities can be created that are easier to handle. Each activity is possible to evaluate from a cost reduction potential and from an investment need.

IFS Applications also allows you to perform commonality analyses. If an item is used in multiple places, commonality analysis helps you see which components are common for different structures and whether they can be used for other parts to save money. Cost/value analysis helps you analyze the costs of a component or product in relation to customer value.

## Develop a lean enterprise with IFS Applications

Lean enterprise is viewed as the corporate approach for the 21st century that will provide complex ETO organizations with the ability to remain competitive and to become market leaders through their agility and responsiveness to change.

Many companies are reaping the benefits of lean practices. The reasons for your company adopting lean enterprise may vary according to your particular market circumstances. If your competition is going lean, you may have to go lean also, just to stay in business. If they aren't lean yet, you can gain a great competitive advantage by implementing lean techniques first. No matter what your reasons are for becoming a lean enterprise, it is an exciting and profitable adventure and one in which IFS Applications can help you along every step of the way.

## About IFS and IFS Applications

IFS develops and supplies component-based business applications for medium and large enterprises and organizations. IFS Applications, which can be implemented step by step, is based on web and portal technology. The solution offers 60+ enterprise application components used in manufacturing, supply chain management, customer relationship management, service provision, financials, product development, maintenance and human resource administration. IFS offers customers an easier, more open alternative.

IFS is a leading global business applications supplier with sales in 45 countries and more than 350,000 users worldwide. The company is listed on the Stockholm Stock Exchange (XSSE: IFS).

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